

IN THE CLAIMS

What is claimed is:

- 1 1. A method of forming a plurality of semiconductor device layers, comprising the
2 steps of:
3 forming an oxide layer by reacting hydrogen and oxygen on a surface
4 of an insulating layer deposited over a wafer; and
5 forming a conductive gate layer over the oxide layer.

- 2 2. The method of claim 1, wherein:
3 the reacting of hydrogen and oxygen is performed at a wafer
4 temperature in the range of about 800°C to 1300°C.

- 1 3. The method of claim 1, wherein:
2 the oxide layer has a thickness in the range of 20-60 angstroms.

- 1 4. The method of claim 1, wherein:
2 the reacting of hydrogen and oxygen on the wafer surface has a
3 duration in the range of 30 seconds to 2 minutes.

- 1 5. The method of claim 4, wherein:
2 the reacting of hydrogen and oxygen on the wafer surface has a
3 duration in the range of approximately 1 minute.

- 1 6. The method of claim 1, wherein:
2 the conductive gate material includes polysilicon.
- 1 7. The method of claim 1 wherein:
2 the oxide layer and conductive gate layer form a SONOS-type device.
- 1 8. The method of claim 1 wherein steps prior to forming the oxide layer comprise:
2 forming a tunnel dielectric; and
3 depositing the insulating layer, the insulating layer being a charge
4 storing dielectric layer.
- 1 9. The method of claim 8 wherein:
2 the charge storing dielectric layer includes silicon nitride.
- 1 10. The method of claim 1, further including:
2 forming a gate etch mask; and
3 etching to form gate stacks; and
4 forming insulating sidewalls on the gate stacks.
- 1 11. The method of claim 8, wherein:
2 forming the tunnel dielectric, forming the charge storing dielectric
3 layer, and forming the oxide layer occur in a single wafer processing tool.

1 12. A method, comprising the steps of:
2 forming a bottom dielectric on a substrate surface;
3 forming a middle dielectric over the bottom dielectric; and
4 forming a top dielectric over the middle dielectric by heating the
5 substrate to less than about 1200 °C for less than two minutes.

1 13. The method of claim 12, wherein:
2 forming the top dielectric further includes reacting the surface of the
3 middle dielectric layer with hydrogen and oxygen.

1 14. The method of claim 12 wherein:
2 the middle dielectric comprises at least one layer selected from the
3 group consisting of silicon nitride, silicon oxynitride, and silicon rich silicon
4 nitride.

1 15. The method of claim 12 wherein:
2 the bottom dielectric has a thickness of less than 15 angstroms; and
3 the top dielectric has a thickness of less than 50 angstroms.

10054515-102201

1 16. A method of manufacturing a SONOS-type device, comprising the steps of:
2 oxidizing a charge storing dielectric comprising at least one layer that
3 includes silicon and nitrogen by reacting hydrogen and oxygen to form a top
4 oxide layer over the charge storing dielectric.

1 17. The method of claim 16, wherein:
2 the oxidizing lasts for less than two minutes.

1 18. The method of claim 16, wherein:
2 the oxidizing occurs at a temperature of less than 1200 °C.

1 19. The method of claim 16, further including:
2 a tunnel dielectric formed below the charge storing dielectric;
3 forming a conductive gate layer over the top oxide layer; and
4 patterning at least the top oxide and charge storing dielectric to form a
5 gate stack.

1 20. The method of claim 16, wherein:
2 the top dielectric has a thickness greater than 20 angstroms.

1054545-102201